T. A. EDISON.

Electric-Lights.

No. 227,227. Patented May 4, 1880.

Fig. 1.

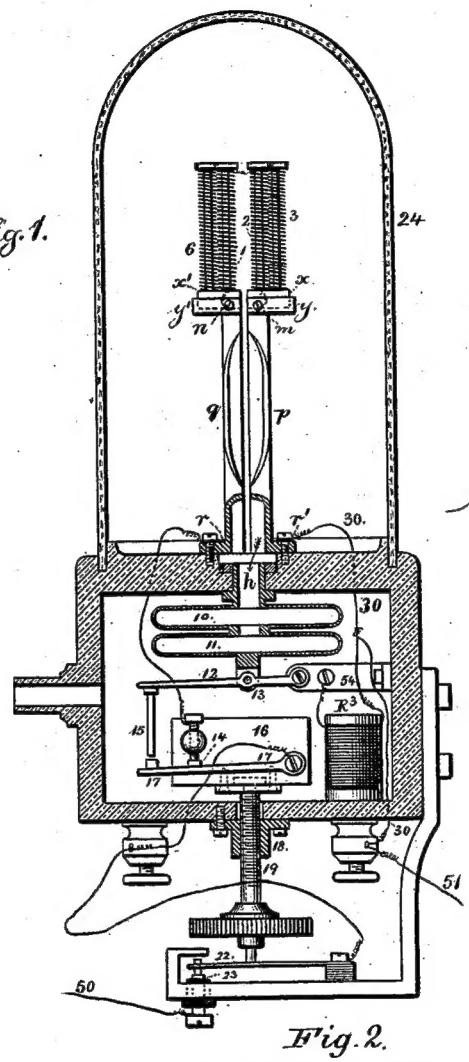


Fig. 3.

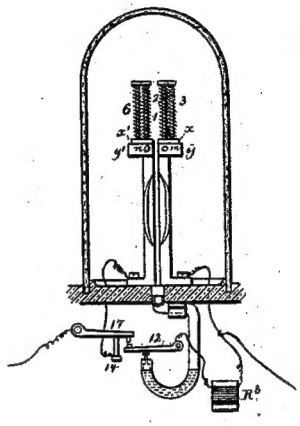
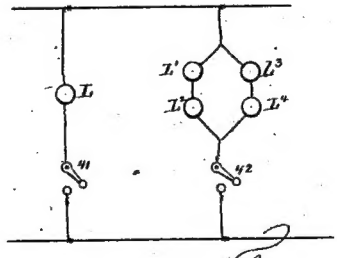


Fig. 4.

Case No. 111.

Fig. 2.



Witnesses

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UNITED STATES PATENT OFFICE.

THOMAS A. EDISON, OF MENLO PARK, NEW JERSEY.

ELECTRIC LIGHT.

SPECIFICATION forming part of Letters Patent No. 227,227, dated May 4, 1880.

Application filed February 10, 1879.

To all whom it may concern:

Be it known that I, THOMAS A. EDISON, of Menlo Park, in the State of New Jersey, have invented an Improvement in Electric Lights, (Case No. 171,) of which the following is a specification.

The object of this invention is to economically apply electricity to lighting and to insure uniformity of action in the different lamps.

The invention consists, first, in an improved incandescent lamp and regulator; second, in an automatic switch connected with the regulator of the lamp to connect it with the line; third, in grouping several lamps in such a manner that their combined resistance shall be the same as one lamp.

Figure 1 represents the lamp and the circuit-connections. 1, 2, 3, 4, 5, and 6 are coils of wire—preferably flattened wire formed of an alloy of platinum and iridium, or metallic nickel. There are six of these coils, (see Fig. 4,) each of which is slipped over a pencil of pipe-clay, which may be provided at the top end with a head, as shown in Fig. 1.

These pipe-clay pencils are secured to pipe-clay disks x x', resting in the split metal cup y y'. Coil No. 2 has its lower end connected to the binding-screw m of the cup y. The top end of the spiral 2 connects to the spiral 3, the bottom of 3 to 4, the top of 4 to 5, the bottom of 5 to 6, the top of 6 to 1. The bottom of 1 connects to the screw n of the brass cup y'.

q and p are electric conductors between the divided cup y y' and the divided base r and r', and at the same time serve as supports to the burner.

The wire of the coils as it comes from the winding-machine is stretched to open the coils, and then dipped in a thick milky solution of zircon oxide and clay and then passed through a hydrogen flame. This causes a very slight coating to adhere to the wire.

The coils are pressed together and placed on the fire-clay pencils, and the coils are confined between the heads of the fire-clay pencils and the clay blocks x x', into holes in which blocks the ends of such fire-clay pencils are pressed. The coils forming the spirals are thus in contact, or nearly so, but they do not connect electrically; hence the current passes through the whole length of the wire. The expansion of the pencil of clay, or clay and zircon, is about equal to that of the metal coils; hence their condition is not materially altered by the heat.

The spirals are of such a size that they nearly touch each other. Hence the light and heat are confined within the circular range of spirals, and aid in intensifying the light and heat of the electric candle, and the radiation is mostly from the outside portions of the coils.

The pipe-clay disks y y' serve both for holding the pencils and preventing the lower ends of the spirals from cooling by having their heat conducted downward by the metal supports q p.

24 is a glass globe or shade set over the burner, and made air-tight, or nearly so. Air can only pass through the orifice h, as shown by the arrow.

The regulation by the electric current, and the consequent temperature of the burner, is obtained by the expansion of the air contained in the glass shade 24.

10 and 11 are flexible chambers, similar to those used in an aneroid-barometer. The expansion of the air by the heat of the burner causes these chambers to bulge outwardly and gives a downward motion to the lever 12, which is secured to the chamber 11 at 13.

15 is a long rod tipped with platinum. 14 is a contact-point, and the lever 17 usually rests against it; but when the heat of the burner has reached its maximum point it has expanded the air sufficiently to cause the lever 12 and point 15 to separate the lever 17 from 14 and divert the electric current from the lamp.

When the lamp is in operation the current passes from wire 50 to point 23, which is in contact with the spring 22, (the regulator-screw 19 keeping 22 and 23 in contact;) thence the current passes to binding-post and lever 17; thence to contact-point 14, to r, through the spirals to r'; thence by wire 30 to the other binding-post, and out by wire 51.

If, now, the temperature of the spirals becomes too great, the lever 12 and point 15 are thrown downward, and the lever 17 separated

from point 14, thus throwing the lamp entirely out of circuit and placing in circuit a resistance, R^3, equal to it, the object of the resistance being to prevent an excessive spark at the contact-points.

I remark that if the current is accurately circulated for the lamp the resistance of R^3 may be much greater than the lamp, and such resistance may even be in the form of several spirals placed between the spirals 1, 2, 3, 4, 5, and 6.

When the lever 17 is in contact with the point 15 and lever 12, the current passes by wire 50 to 23; thence through 22 to binding-post, to 17; thence through 15 and 12 to the coil R^3 by wire 54; thence by wire 30 to the binding-post, and out by wire 51.

The block 16, upon which the lever 17 and point 14 are attached, is movable, and it is adjusted by means of the screw 19, that passes through the stationary nut 18. By moving this block 16 toward the lamp the circuit is broken to the candle and closed through 15 and 17, and in so doing the circuit from 50 is broken between the spring 22 and screw-point 23. The reverse movement causes the lamp to be automatically connected to the circuit when the regulator-screw is turned downward to light the lamp.

The parts can be so arranged that the lamp will be disconnected when it is giving a light equal to about two-candle power.

In Fig. 2 are shown switches 41 and 42, whereby the lamps may be disconnected from the circuit after being turned down, as shown in my previous application, No. 169.

It is obvious that any of the various forms of thermal circuit-regulator already described in my previous patents may be combined with the burner herein shown.

In Fig. 3 is shown the before-described lamp with mercury substituted for the aneroid-chambers.

In Fig. 2 I have shown a single lamp, L, having, say, one thousand ohms resistance, placed in one branch, and in another branch I have shown four electric candles or burners, L' L^2 L^3 L^4, in one lamp. The burner being in close proximity and arranged in two branch circuits, the resistance of each branch being two thousand ohms, the two branches will jointly offer a resistance of one thousand ohms, the same as the resistance of the one lamp L.

By this arrangement various numbers of lamps may be placed in branch circuits between the same main conductors and the resistance be equal in each branch.

In my application for a patent No. 162 I have shown a glass shade in which the air is confined, and acts by its expansion upon a diaphragm to operate the electric-circuit regulator, and in my application No. 162 I have represented the confined air as acting upon a column of mercury, and in my application for a patent No. 166 I have shown the lamp as composed of a flattened coil of wire, and in my application No. 169 I have shown a rheostat or resistance that is thrown into the circuit when the lamp is extinguished.

I claim as my invention—

1. The combination, with the electric lamp and its transparent shade, of the aneroid-chambers 10 and 11 and electric-circuit regulator, substantially as set forth.

2. In an electric lamp, the combination, with a core of pipe-clay or equivalent non-conducting material and a base of similar material, to which the core is connected, a helix of platina or equivalent material surrounding the core and the wires of the electric circuit connected thereto, substantially as set forth.

3. In an electric lamp, a circular range of parallel helices connected alternately at top and bottom, and at the ends to the electric conductors, substantially as set forth.

4. The combination, in an electric lamp, of the divided base r r', standards p q, divided cup y y', and a circular range of parallel helices and circuit-connections, substantially as set forth.

5. The combination, with the electric lamp and thermal circuit-regulator, of the movable block 16, levers 12 and 17, contact-points 14 15, adjusting-screw 19, rheostat R^3, and circuit-connections, substantially as and for the purposes set forth.

6. The automatic switch 22 23, in combination with the screw 19, block 16, circuit-connections, thermal circuit-regulator, and electric lamp, substantially as set forth.

7. The arrangement of four electric lamps in a divided branch circuit between two main conductors, substantially as and for the purposes set forth.

Signed by me this 6th day of February, A. D. 1879.

THOMAS A. EDISON.

Witnesses:
STOCKTON L. GRIFFIN,
WM. CARMAN.